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EXAMINER	
CHANG, JON CARLTON	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/978,000	SIMON ET AL.
	Examiner	Art Unit
	Jon Chang	2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,9-11,15,18 and 28* is/are rejected.

7)☒ Claim(s) *6-8,12-14,16,17,19-27,29 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/13/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Objections

1. Claim 28 is objected to because of the following informalities: the preamble of claim 28 is not grammatically correct. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 9, 18 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "Robust Affine Invariant Matching with Application to Line Features" by Tsai.

As to claim 1, Tsai discloses a method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image (page 393, right column, first paragraph); and

for each target primitive:

identifying any model primitives that at least partially match the target primitive (page 393, right column, under "The recognition stage"; section 5.2); and

for each identified model primitive, calculating a figure of merit indicative of a degree of correspondence between the target primitive and the model primitive (section 5.2).

As to claim 2, Tsai method as claimed in claim 1, wherein the step of deriving at least one target primitive comprises steps of:

detecting geometric features within the image (components of the lines, i.e., points);

analyzing the detected geometric features to find large scale structures of the image (via the Hough transform; page 293, right column, first paragraph, and first paragraph of section 3; the Hough transform finds edges/lines in an image);

approximating each large scale structure with at least one respective primitive; deriving a basis from at least one of the primitives (via the Hough transform, page 293, right column, first paragraph, and first paragraph of section 3; basis is formed by three lines, section 2); and

representing each of the primitives as invariants in the derived basis (section 2).

As to claim 3, Tsai discloses a method as claimed in claim 2, wherein the step of approximating each large scale structure comprises a step of mapping a respective primitive through at least a sub-set of the geometric features forming the large scale structure (note section 3; each line detected by the Hough transform approximate the

actually lines since they may "deviate slightly from the true values", and a primitive goes through at least the two endpoints of the line).

As to claim 4, Tsai discloses a method as claimed in claim 3, wherein each primitive comprises a straight line-segment (page 293, right column, first paragraph).

Claim 5 depends from claim 4. Claim 4 refers to a straight line-segment and a curve segment. The rejection of claim 4 has selected the straight line-segment limitation. Therefore, claim 5 is also rejected as it merely further limits a non-selected limitation.

As to claim 9, Tsai discloses a method as claimed in claim 2, wherein the step of deriving a basis comprises steps of: calculating an origin of a respective local coordinate system, and calculating an orientation of the respective local coordinate system (section 2).

Regarding claim 18, Tsai discloses a method as claimed in claim 2, wherein the step of representing each of the primitives as invariants in the derived basis comprises a step of calculating parameters of each primitive relative to a respective local coordinate system of the derived basis (section 5.1, step 1).

As to claim 28, Tsai discloses a method of deriving a model use in a pattern matching method in accordance with claim 1, the method comprising steps of:

deriving at least one model primitive representative of large scale structures of an archetype (section 2);

sampling each model primitive at two or more respective sample locations (section 4);

mapping each sample location to a respective sample bin of a hash table (section 5.1); and

inserting a reference to the respective model primitive in the sample bin (section 5.1).

4. Claims 1 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "Occluded Object Recognition Using Extended Local Features and Hashing" by Baek et al. (hereinafter "Baek").

With regard to claim 1, Baek discloses a method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image (see section II, the corners, arcs, parallel lines, or corner-arcs); and

for each target primitive:

identifying any model primitives that at least partially match the target primitive (page 2370, left column, subsection "B. Matching"); and

for each identified model primitive, calculating a figure of merit indicative of a degree of correspondence between the target primitive and the model primitive (page 2370, left column, subsection "B. Matching"; the figure of merit is the "compatibility").

As to claim 28, Baek disclose a method of deriving a model use in a pattern matching method in accordance with claim 1, the method comprising steps of:

deriving at least one model primitive representative of large scale structures of an archetype (e.g., section II, e.g., corners, arcs, etc.);

sampling each model primitive at two or more respective sample locations (page 2369, right column, third paragraph);

mapping each sample location to a respective sample bin of a hash table (last paragraph of page 2369); and

inserting a reference to the respective model primitive in the sample bin (page 2370, left column, paragraph before "B. Matching").

5. Claims 1-5, 9-11, 15, 18 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "ForeSight: Fast Object Recognition Using Geometric Hashing with Edge-Triple Features" by Procter et al. (hereinafter "Procter").

With regard to claim 1, Procter discloses a method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image (the edge triples, section 3,first paragraph); and

for each target primitive:

identifying any model primitives that at least partially match the target primitive (page 890, paragraph under Fig.1); and

for each identified model primitive, calculating a figure of merit indicative of a

degree of correspondence between the target primitive and the model primitive (page 890, paragraph under Fig.1; the peaks are the figure of merit).

As to claim 2, Procter discloses a method as claimed in claim 1, wherein the step of deriving at least one target primitive comprises steps of:

detecting geometric features within the image (e.g., lines, first paragraph of section 3);

analyzing the detected geometric features to find large scale structures of the image (e.g., the connected straight edges of the object, first paragraph of section 3);

approximating each large scale structure with at least one respective primitive; deriving a basis from at least one of the primitives (first and third paragraphs of section 3); and

representing each of the primitives as invariants in the derived basis (this is the inherent purpose of the basis, as discussed with respect to the known use of point bases, page 890, left column, first three lines).

As to claim 3, Procter discloses a method as claimed in claim 2, wherein the step of approximating each large scale structure comprises a step of mapping a respective primitive through at least a sub-set of the geometric features forming the large scale structure (note Fig.1).

As to claim 4, Procter's primitive comprises three straight line segments, therefore it comprises a straight line-segment.

Claim 5 depends from claim 4. Claim 4 refers to a straight line-segment and a curve segment. The rejection of claim 4 has selected the straight line-segment

limitation. Therefore, claim 5 is also rejected as it merely further limits a non-selected limitation.

As to claim 9, Procter discloses a method as claimed in claim 2, wherein the step of deriving a basis comprises steps of: calculating an origin of a respective local coordinate system and calculating an orientation of the respective local coordinate system (the coordinate frame of a basis, as per section 2.1, inherently includes an origin and orientation).

As to claim 10, Procter discloses method as claimed in claim 9, wherein the step of deriving a basis comprises steps of: deriving a plurality of bases, and selecting at least one of the plurality of derived bases (page 890, left column, first 3 lines).

Regarding claim 11, Procter discloses a method as claimed in claim 10, wherein the step of selecting at least one of the plurality of derived bases comprises selecting at most two bases derived using any one primitive (page 890, left column, first 3 lines; third paragraph of section 3; at least one basis is selected, so at most two bases are selected).

As to claim 15, Procter discloses that the step of calculating the orientation of the respective local coordinate system comprises steps of: selecting one of the primitives used to calculate the origin, and setting the orientation of the coordinate system based on an orientation of the selected primitive (since the primitive determines the basis, the orientation of the primitive determines the orientation of the coordinate system).

Regarding claim 18, Procter discloses method as claimed in claim 2, wherein the step of representing each of the primitives as invariants in the derived basis comprises a step of calculating parameters of each primitive relative to a respective local coordinate system of the derived basis (first paragraph of section 3; the angles are inherently invariant with respect to the basis).

Regarding claim 28, Procter discloses a method of deriving a model use in a pattern matching method in accordance with claim 1, the method comprising steps of:

deriving at least one model primitive representative of large scale structures of an archetype (section 3; fig.1);

sampling each model primitive at two or more respective sample locations (page 890, right column, first paragraph; sampling is provided by two projections for each edge-triple);

mapping each sample location to a respective sample bin of a hash table (page 890, right column, first paragraph); and

inserting a reference to the respective model primitive in the sample bin (page 890, right column, first paragraph).

Allowable Subject Matter

6. Claims 6-8, 12-14, 16-17, 19-27 and 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

References Cited

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,953,451 to Syeda-Mahmood discloses a method of indexing words in handwritten document images using hash tables.

U.S. Patent 6,275,613 to Aiger discloses a method for locating a model in an image which utilizes a hash table.

U.S. Patent 6,735,343 to Michael discloses a polygon finder which utilizes geometric matching.

"Geometric Hashing with Attributed Features" by Liu et al. teaches using geometric hashing and point locations and orientations.

"Affine Invariant Recognition of 2D Occluded Objects Using Geometric Hashing and Distance Transformation" by Au et al. utilizing geometric hashing to recognize occluded objects.

"Geometric Hashing: an Overview" by Woflson et al. provides an overview of geometric Hashing.

"An Improved Model-Based Matching Method Using Footprints" by Hong et al. teaches a geometric hashing technique.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon Chang whose telephone number is (703)305-8439. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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October 1, 2004